

### REMARKS/ARGUMENTS

Claims 1-4, 6-18 and 21-42 were previously pending in this application. Claims 1, 3, 12-18, 21, 22, 24, 29, 31, 34, 37, and 39 have been amended. Support for these amendments can be found throughout the specification, for instance at paragraph [40] and Fig. 4 of the present specification, at a minimum. Claims 17 and 18 stand withdrawn from consideration pending allowance of independent claim 1. No claims have been added or canceled. Hence, claims 1-4, 6-18 and 21-42 remain pending. Reconsideration of the subject application as amended is respectfully requested.

#### **I. ELECTION/RESTRICTION**

The Examiner has alleged that amended claims 17-18 are directed to a species invention that is distinct from that originally searched, and as such has withdrawn claims 17-18 from consideration as being directed to a non-elected invention (pending rejoinder upon an indication of an allowable generic claim). Applicants hereby acknowledge the withdrawal of claims 17-18 from consideration pending allowance of a generic claim, but respectfully traverse the election of species requirement.

The Examiner asserts that “[n]ewly amended claims 17-18 are directed to an invention that is independent or distinct from the invention originally claimed.” In support of the election requirement, the Examiner asserts that claim 1 as originally presented and examined was directed to cores being formed on an undercladding layer, and that “[c]laims 17-18 are presently directed to a mutually exclusive species: where the core is within the undercladding.” The Examiner then states that such “species was never searched or examined,” and that it would place an unreasonable burden on the Office to now search/examine this new species. *Office Action, Mailed Feb. 14, 2005 at Page 2.*

Applicants respectfully traverse and submit that no additional burden should fall on the Office in consideration of claims 17 and 18, as now pending. Originally filed claims 17 and 18 were likewise directed to optical core(s) formed within trenches etched in the undercladding layer. As such, the scope of the allegedly “mutually exclusive species” of amended claims 17 and 18 was not presented by way of the amendment entered November 26, 2004, but rather was

part of the originally pending claims, and thus formed part of the original search. Accordingly, it is respectfully submitted that no undue burden is placed on the Office in consideration of claims 17 and 18. Withdrawal of this election requirement and consideration of claims 17 and 18 is therefore requested.

## **II. CLAIM REJECTIONS UNDER 35 U.S.C. § 103(A)**

### **A. Rejection Based on Bazylenko, in view of Dragone**

Claims 1-2, 15-16 and 22-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the cited portions of U.S. Patent No. 6,154,582 to Bazylenko, *et al.* (hereinafter “Bazylenko”), alone or in view of the cited portions of U.S. Patent No. 5,136,671 to Dragone, *et al.* (hereinafter “Dragone”). This rejection is respectfully traversed for at least the reasons which follow:

The present claims relate to methods, systems, and media for forming optical waveguides including the formation of a high-density plasma and the deposition of a plurality of separated high contrast silicate glass optical cores on an undercladding layer using the high-density plasma, wherein the high contrast optical cores define a sequence of gaps. Each of the high contrast silicate glass optical cores is formed with a refractive index greater than a refractive index of the undercladding layer.

The Examiner acknowledges that Bazylenko does not disclose a plurality of separated cores, but asserts that it “would have been obvious to create more than one waveguide core so as to be able to multiply the amount of data carried.” *Office Action mailed Feb. 14, 2005* at page 3. In further support of the rejection, the Examiner relies on Dragone to allegedly show “that multiple separated waveguides is conventional.” *Id.*

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. The teaching or suggestion to make the claimed combination must be found in the prior art, and not be based on applicants’ disclosure. See M.P.E.P. §§2143.01 and 2143.03.

In a proper obviousness determination, the changes from the prior art must be evaluated in terms of the whole invention, including whether the prior art provides any teaching or suggestion to one of ordinary skill in the art to make the changes that would produce the claimed invention. See *In re Chu*, 36 U.S.P.Q.2d 1089, 1094 (Fed. Cir. 1995). This includes what could be characterized as simple changes. See, e.g., *In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984) (Although a prior art device could have been turned upside down, that did not make the modification obvious unless the prior art fairly suggested the desirability of turning the device upside down.). Only when the prior art teaches or suggests the claimed invention does the burden fall on the applicant to rebut that *prima facie* case. See *In re Dillon*, 16 U.S.P.Q.2d 1897, 1901 (Fed. Cir. 1990) (in banc), *cert. denied*, 500 U.S. 904 (1991).

As mentioned above, the present claims require a plurality of high contrast optical cores that define a sequence of gaps. The Examiner asserts that it is not relevant that Bazylenko does not teach a plurality of cores “because the courts have long recognized that duplication of parts is usually an obvious modification.” In this regard, the Examiner cites to MPEP § 2144.04 and *In re Harza*, 124 U.S.P.Q. 378, and asserts that “mere duplication of parts has not patentable significance unless a new and unexpected result is produced.” *Office Action mailed Feb. 15, 2005* at Page 3-4. Applicants respectfully traverse. The Examiner relies upon *Harza* as establishing a *per se* rule that duplication of parts is obvious. As stated by the Federal Circuit in *In re Ochiai*, 37 U.S.P.Q.2d 1127, 1133 (Fed. Cir. 1995), “reliance on *per se* rules of obviousness is legally incorrect and must cease.” As such, it is submitted that even if a generalized “duplication of parts” is known, such a *per se* rule does not establish a *prima facie* case of obviousness.

For a *prima facie* case of obviousness to be established, the teachings from the prior art itself must suggest the claimed subject matter to one of ordinary skill in the art. See *In re Rinehart*, 189 U.S.P.Q. 143, 147 (CCPA 1976). The mere fact that the prior art could be modified as proposed by the examiner is not sufficient to establish a *prima facie* case of obviousness. See *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). The Examiner must explain why the prior art would have suggested to one of ordinary skill in the art the desirability of the modification. See *Fritch*, 23 U.S.P.Q.2d at 1783-84.

The explanation given by the Examiner, beyond a *per se* rule, is that it would have been obvious to create more than one waveguide core so as to be able to multiply the amount of data carried. However, as explained in the specification, incorporation of multiple photonic components, such as optical cores, onto a single chip has faced many challenges, including propagation loss. The Examiner points to no teachings in the art concerning adequate methodologies for achieving a plurality of high contrast optical cores defining a sequence of gaps, as required by the claims. More particularly, as explained in the specification, known PECVD techniques are generally not suitable for manufacturing high contrast optical cores due to unsatisfactory propagation loss and other detrimental limitations. However, in accordance with the present invention, it has been found that a plurality of high contrast optical cores can reliably be produced (*e.g.*, without unsatisfactory propagation loss).

Whatever else Bazylenko does disclose, it does not disclose or suggest a plurality of high contrast optical cores that define a sequence of gaps. Even assuming *arguendo* that one of skill in the art would be motivated to attempt to incorporate additional cores into the waveguide disclosed by Bazylenko in order to add additional data capacity, there is no teaching or suggestion of adequate methodologies, systems or media to obtain a plurality of high contrast optical cores. First, as acknowledged by the Examiner, Bazylenko does not disclose a method, system or media for obtaining a plurality of optical cores. Further, Bazylenko does not disclose or suggest high contrast optical cores. Although Bazylenko does disclose that possible index differences between the core and the cladding layers may range from "0.004 to about 0.02" the only embodied difference is about 0.008. *See Bazylenko* at Col. 6, Ln. 25-33 and Example 1. As such, Bazylenko does not teach, suggest, or contemplate, a plurality of high contrast optical cores, as understood by those of skill in the art. Further, there is no specific disclosure to teach or suggest that the plurality of high contrast optical cores should define a sequence of gaps.

The Examiner's reliance on Dragone to illustrate multiple, separate waveguides as conventional does nothing to remedy these deficiencies. Whatever else Dragone does disclose, it does not disclose single waveguides with multiple cores. Rather, it discloses a multiplex system of a plurality of separate waveguides. The Examiner points to no specific disclosure concerning the optical cores within the waveguides. Further, the Examiner provides no direction as to how

one of skill would be lead to modify the methodologies of Bazylenko related to making waveguides based on the disclosure of Dragone related to multiplexes of waveguides.

With regard to claim 28, the Examiner takes Official Notice, and asserts that the claimed dopants are routinely used in optical waveguides. Applicants respectfully traverse. Absent a motivation to obtain a high contrast optical core, one of skill would not be directed to those specifically claimed dopants. As such, Applicants submit that the Examiner is using improper hindsight reasoning to arrive at the presently claimed invention.

For at least these reasons, Applicants traverse the rejection of claims 1-2, 15-16 and 22-42, and respectfully request withdrawal of this rejection.

B. Rejection Based on Johnson, in view of Dragone

Claims 1, 2-4, 6-14, 22-26 and 29-42 stand rejected under 35 U.S.C. § 102(a) as being anticipated by the cited portions of U.S. Patent No. 6,614,977 to Johnson, *et al.* (hereinafter "Johnson"), alone or in view of Dragone. This rejection is respectfully traversed for at least the reasons which follow.

Initially, it is noted that the claims are cited as rejected under 35 U.S.C. § 102(a) as being anticipated by Johnson, alone or in view of Dragone. However, the Examiner then goes on to acknowledge that Johnson does not disclose a plurality of separate cores. As the rejection is over Johnson "alone or in view of Dragone," as each of the independent claims require a plurality of separate cores, as the Examiner acknowledges that the primary reference is missing a limitation of the independent claims, and as the rejection is under the heading "Claim Rejections - 35 U.S.C. § 103" --- Applicants are proceeding under the assumption that this rejection is intended as a rejection under 35 U.S.C. § 103(a) as being unpatentable over the cited portions of U.S. Patent No. 6,614,977 to Johnson, *et al.* (hereinafter "Johnson"), alone or in view of Dragone. However, in the event that the Examiner intends to maintain a novelty rejection, the below arguments equally apply.

Again, the present claims relate to methods, systems, and media for forming optical waveguides including the formation of a high-density plasma and the deposition of a plurality of separated high contrast silicate glass optical cores on an undercladding layer using the high-

density plasma, wherein the high contrast optical cores define a sequence of gaps. Each of the high contrast silicate glass optical cores is formed with a refractive index greater than a refractive index of the undercladding layer.

In support of the rejection, the Examiner acknowledges that Johnson does not disclose the plurality of separate cores, but alleges that "it would have been obvious to create more than one waveguide core so as to be able to multiply the amount of data carried." *Office Action mailed Feb. 14, 2005* at page 3. Applicants respectfully traverse. Again, the explanation given by the Examiner, beyond an impermissible *per se* rule, is that it would have been obvious to create more than one waveguide core so as to be able to multiply the amount of data carried. However, as explained in the specification, incorporation of multiple photonic components, such as optical cores, onto a single chip has faced many challenges, including propagation loss. The Examiner points to no teachings in the art concerning adequate methodologies for achieving a plurality of high contrast optical cores defining a sequence of gaps *via* a high density plasma, as required by the claims. More particularly, as explained in the specification, known PECVD techniques are generally not suitable for manufacturing high contrast optical cores due to unsatisfactory propagation loss and other detrimental limitations. However, in accordance with the present invention, it has been found that a plurality of high contrast optical cores can reliably be produced *via* high density plasma (*e.g.*, without unsatisfactory propagation loss).

Whatever else Johnson does disclose, it does not disclose or suggest formation of a plurality of high contrast optical cores that define a sequence of gaps *via* a high density plasma. Even assuming *arguendo* that one of skill in the art would be motivated to attempt to incorporate additional cores into the waveguide disclosed by Johnson to thereby add additional data capacity, there is no teaching or suggestion of adequate methodologies, systems or media to obtain a plurality of high contrast optical cores *via* a high density plasma. First, as acknowledged by the Examiner, Johnson does not disclose a method, system or media for obtaining a plurality of optical cores. Further, Johnson does not disclose or suggest high contrast optical cores. Although Johnson does disclose that the optical cladding can include any number of materials having a lower index of refraction than the thin film forming the optical component, Johnson is silent with regard to the actual magnitude of difference in refractive index, or the desirability of

maintaining a specific level of contrast. *See Johnson* at Col. 6-7. In terms of propagation loss, *Johnson* is focused on hydrogen content alone.

In addition, *Johnson* does not disclose or suggest the formation of high contrast optical cores *via* a high density plasma. Although *Johnson* mentions in passing HDP-CVD, *Johnson* does nothing more than mention it as a possible vapor deposition technique. *Johnson* only embodies PECVD, and does not provide any teaching or suggestion to one of skill in the art of how to obtain high contrast optical cores *via* a high density plasma. In this regard, Applicants submit that at least claims 2-11, and 22-42 are further patentable over *Johnson* in that *Johnson* fails to teach or suggest a high density plasma process wherein the pressure within the process chamber is less than 100 millitorr. The only specific deposition conditions described by *Johnson* involve a PECVD system, wherein a chamber pressure of about 300 millitorr is utilized. *See Johnson*, Col. 7, Ln. 13-22.

As such, *Johnson* does not teach, suggest, or contemplate, a plurality of high contrast optical cores obtained *via* high density plasma, as understood by those of skill in the art. Further, there is no specific disclosure to teach or suggest that the plurality of high contrast optical cores should define a sequence of gaps.

The Examiners reliance on *Dragone* to illustrate multiple, separate waveguides as conventional does nothing to remedy these deficiencies. Whatever else *Dragone* does disclose, it does not disclose single waveguides with multiple cores. Rather, it discloses a multiplex system of a plurality of separate waveguides. The Examiner points to no specific disclosure concerning the optical cores within the waveguides. Further, the Examiner provides no direction as to how one of skill would be lead to modify the methodologies of *Johnson* related to making waveguides based on the disclosure of *Dragone* related to multiplexes of waveguides.

For at least these reasons, Applicants traverse the rejection of claims 1, 2-4, 6-14, 22-26 and 29-42, and respectfully request withdrawal of this rejection.

**CONCLUSION**

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and indication of such is respectfully requested.

It is not believed that extensions of time or fees for net addition of claims are required beyond those that may otherwise be provided for in the documents accompanying this paper. However, if additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefor (including fees for net addition of claims) are hereby authorized to be charged to our Deposit Account Number 20-1430. Applicants likewise authorize a charge to Deposit Account Number 20-1430 for any other fees related to the present application that are not otherwise provided for in the accompanying documents.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (303) 571-4000.

Respectfully submitted,



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